




# ENERGY SECTOR

GAS & STEAM  
TURBINES

*Over 40 years' tradition in  
manufacturing safety and  
reliable servosystems for  
Gas and Steam Turbines*

**DUPLOMATIC**  
MOTION SOLUTIONS



In the last 40 years, Diplomatic Motion Solutions has acquired extensive and specific experience in the Energy Sector, developing and implementing a large number of projects in close cooperation with leading companies.

An International Company present all over the world, Diplomatic MS provides both standard and innovative solutions compliant with International Safety Standards.

Its focus is on innovation, using new technologies and protocols to develop new servosystems for gas and steam turbines.

## Diplomatic for GAS & STEAM Market

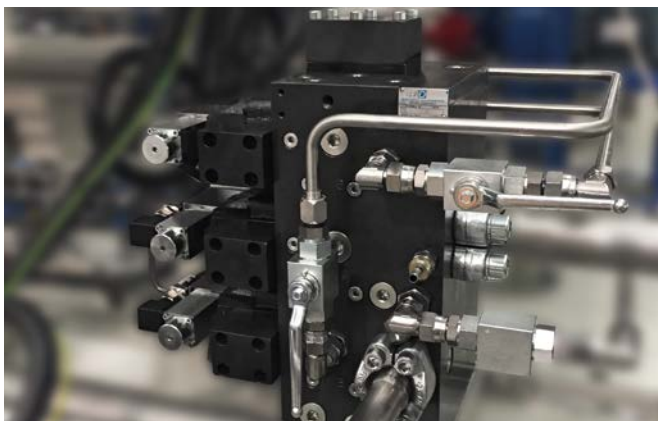
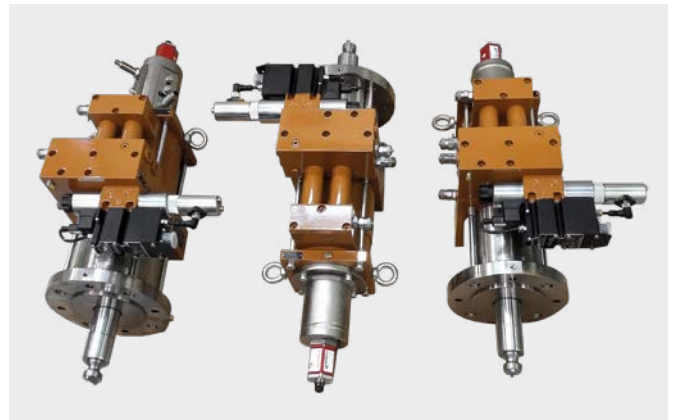
**A critical market that requires safe, certified, state-of-the-art solutions and products**

Diplomatic MS collaborates with customers to create reliable, safe and technological solutions that optimize energy production. The goal is to offer customers excellent quality service and assistance to:

- **Avoid downtime**
- **Reduce maintenance operations**
- **Forecast maintenance**
- **Anticipate market developments**

## A full range of key-in-hand solutions, calibrated, tested and ready for commissioning

- High pressure hydraulic actuators in compliance with new market trends
- Low pressure hydraulic actuators for easy refurbishing of old turbines
- Electromechanical servoactuators with high speed fail safe function
- High and low pressure 2oo3 trip blocks, with SIL3 feature, to match the highest safety level requirements
- Hydraulic power units and lubrication units, hydraulic jacking oil systems and starters complete the package



# HIGH PRESSURE SERVOACTUATORS

High pressure servoactuation systems are nowadays the most preferred solution for the speed control of turbines, and the cost-effective features make them ideal even for medium and small machines.

The compact dimensions together with a huge output forces, result in a very high control accuracy and stability and extremely low, steady state leakage and hysteresis.

Diplomatic high pressure control servoactuators offer a high stiffness three-way spring return architecture, with integral proportional or servo valve for position control and dump valve for trip block.

The fast speed full stroke within  $<0.2$  s can be achieved with the proportional or servo valve during position control mode and with the dump valve during the trip mode.

Stop servoactuators have the same architecture but generally with no proportional or servo valve, while a seat valve drives the opening and the partial stroke test.

Both control and stop servoactuators can be equipped with adjustable soft seating and with various types of position transmitters, with redundancy and flame proof features on request.

Mounting interfaces are always manufactured to match the existing bonnets and stems: our proven SIL2 architecture is ready for mounting and commissioning.

## **ADVANTAGES**

- *Extremely low leakage*
- *Almost null hysteresis*
- *Very high stiffness*
- *Custom mounting interface*
- *Custom sizing*

## **FEATURES**

- *Safe and hazardous locations*
- *Aggressive environment*
- *SIL2*



# LOW PRESSURE SERVOACTUATORS

Despite the market trend requirements for high pressure actuation there are many machines that still need low pressure technology: the refurbishing business and very small turbines are still the main markets.

Duplomatic low pressure servoactuators have the same architecture and characteristics as the high pressure series, and they are suitable for stop and control functions.

They were originally engineered for the refurbishing of old turbines, to perfectly match the mechanical and electrical characteristics of old servoactuators driven by the lube supply pressure.

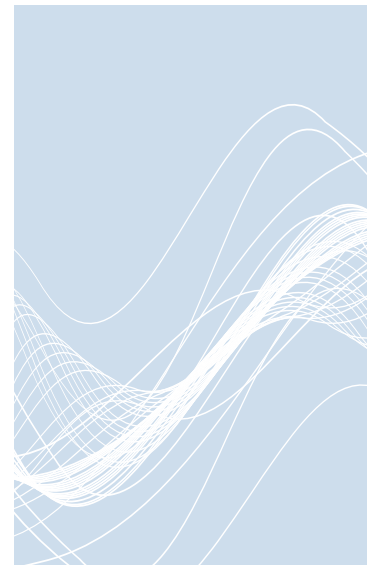
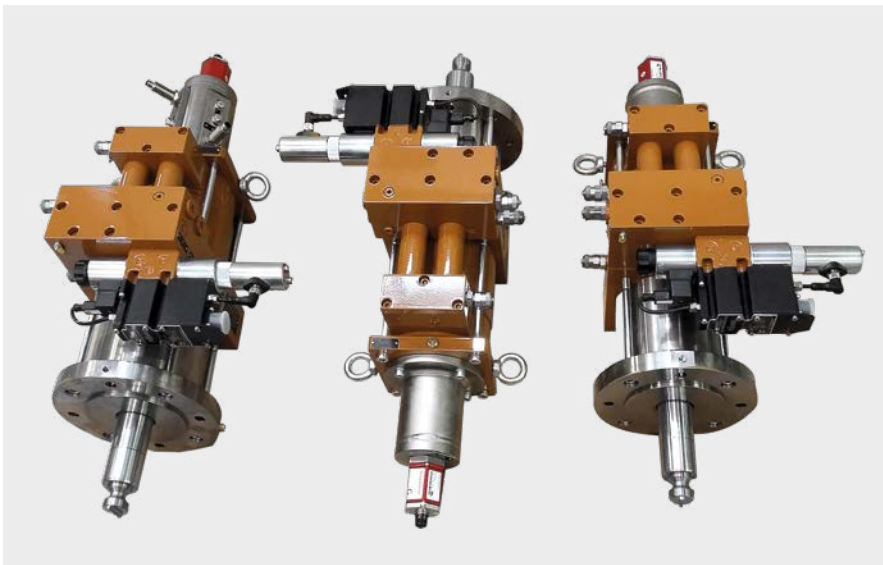
The easy replacements and the no need for additional power or booster units, shorten commissioning time, and consequently reduce the overall refurbishing costs. Furthermore, the low pressure servoactuators offer a customized mounting interface: again, our proven SIL2 architecture is ready for mounting and commissioning.

## **ADVANTAGES**

- *Extremely low leakage*
- *Almost null hysteresis*
- *Easy retrofit*
- *Custom mounting interface*
- *Custom sizing*

## **FEATURES**

- *Safe and hazardous locations*
- *Aggressive environment*
- *SIL2*



# ELECTRONIC SERVOPOSITIONER

A stable speed control of the turbine is mandatory in order to have high efficiency, and the electronic servopositioner is the key component for driving the process valves in position.

EWM-ST is a single channel analog positioning driver with redundant feedback, that can be installed up to 300 meters away from the servoactuator. It takes the 4-20 mA position command from DCS and the 4-20 mA position feedback from the process valve, driving the proportional or servo valves into the desired servoactuator position.

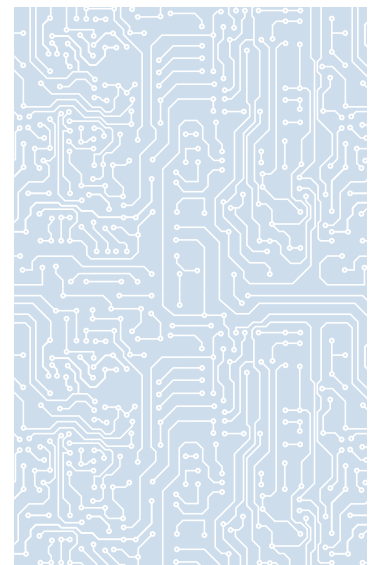
Especially developed for gas & steam turbines, it includes local mode function for easier set up operations, set up of the proportional fail safe position in the event of a failure on the position transmitter, and set up of the force during cut off.

## ADVANTAGES

- Redundant feedback
- Fail safe positioning set up
- Local control mode
- Cut off function

## FEATURES

- DIN rail mounting
- With and without pwm stage
- IP20



# ELECTROMECHANICAL SERVOACTUATORS

Thanks to special and innovative solutions of servo-cylinder specifically designed for this sector, Duplomatic can meet challenging requirements for electromechanical turbine-valve control.

In particular, Duplomatic can provide cylinders with the following features:

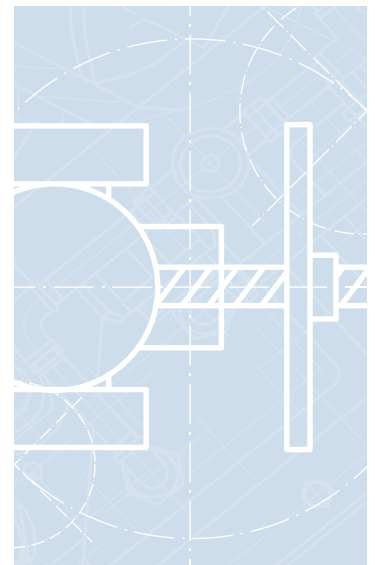
- Use of the most suitable motor solution for the application: i.e. integrated brushless motor, torque motor, etc.
- Possibility to have double feedback signal (rotative and linear), to meet demanding control needs
- Control spring system to be used for trip stroke as well as for backlash recovery
- Use of the most suitable screw transmission to ensure compactness, load capabilities, endurance, etc.
- Oil bath for continuous lubrication of the screw, in order to strongly reduce wear and to improve reliability.

## **ADVANTAGES**

- *Full electromechanical*
- *Easy installation*
- *High efficiency*
- *Fail safe function*
- *Custom sizing*

## **FEATURES**

- *Safe and hazardous locations*
- *Aggressive environment*
- *SIL2*





# TRIP BLOCKS

The trip blocks are a key component in turbine systems, ensuring an emergency stop that prevents injuries caused by over speed.

Duplomatic proposes a full range of 2oo3 SIL3 trip blocks suitable for safe and hazardous locations: the architecture allows the testing of each solenoid valve by mean position transducer on the spools, or by mean external pressure switch or transmitters.

The trip blocks are basically available in four different models from direct drive NG10 up to pilot operated NG25, and they are suitable for tripping up to 400 lpm within 0.1 s.

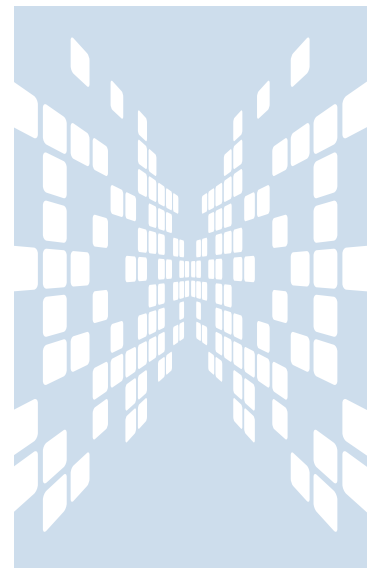
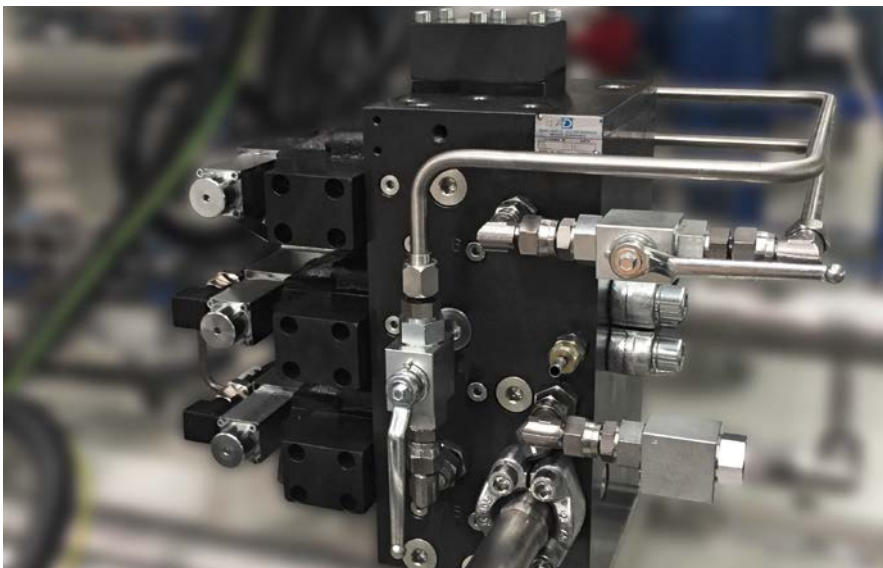
Each trip block also includes a manual trip valve that can be monitored on request. Due to the compact overall dimensions the trip blocks can be easily installed on existing power or lube units, for fast upgrade of old turbines.

## **ADVANTAGES**

- *Compact dimensions*
- *Size up to 400 lpm*
- *High and low pressure*
- *Trip time <100 ms*

## **FEATURES**

- *Safe and hazardous locations*
- *Aggressive environment*
- *2oo3 diagnostic*
- *SIL3*



## LUBRICATION AND POWER UNIT

A high turbine efficiency and reliability level must be maintained to ensure the best productivity, and this is strictly related to the efficiency of the hydraulic systems.

Diplomatic offers a wide range of tailor-made lubrication and power units, engineered for supplying clean and conditioned fluid to the turbines bearings and servoactuators.

Materials, components and instrumentation are carefully chosen to comply with each project, environment and worldwide destination.

### **ADVANTAGES**

- *Custom sizing*
- *Ready for commissioning*

### **FEATURES**

- *ISO and ASME IX*
- *PED*
- *ASME VIII div1 U-STAMP*
- *API 614*
- *SHELL DEP*
- *Safe and hazardous locations*
- *Aggressive environments*



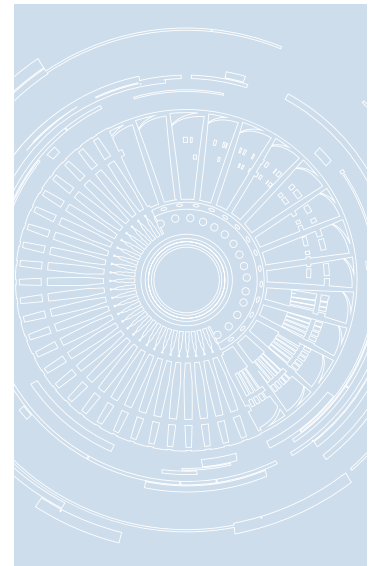
## RETROFIT AND COMMISSIONING

Besides new installations, many old turbines need to be upgraded in terms of safety and production efficiency: sometimes ex-post retrofit costs may exceed cost estimates.

If you wish to refurbish a turbine, we can join you for a preliminary inspection on site for a mutual evaluation of the critical item to be replaced.

If you are working on a new installation, our team can join you for the flushing and commissioning of your turbine.

We support our customers at any stage of their worldwide project!




## DIPLOMATIC GROUP

a global presence with production plants in 3 continents.



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